Strategic Goal: Clean Air

The air in every American community will be safe and healthy to breathe. In particular, children, the elderly, and people with respiratory ailments will be protected from health risks of breathing polluted air. Reducing air pollution will also protect the environment, resulting in many benefits, such as restoring life in damaged ecosystems and reducing health risks to those whose subsistence depends directly on those ecosystems.

BACKGROUND AND CONTEXT

Despite concerted efforts to achieve cleaner, healthier air, air pollution continues to be a widespread public health and environmental problem in the United States, contributing to illnesses such as cancer, respiratory, developmental and reproductive problems. In many cases, air pollutants end up on the land or in rivers, lakes and streams, harming the life in them. Air pollution also makes soil and waterways more acidic, reduces visibility and corrodes buildings.

EPA is responding to air pollution because the problem is national and international in scope. The majority of the population lives in expanding urban areas, where air pollution crosses local and state lines and, in some cases, crosses our borders with Canada and Mexico. Federal assistance and leadership are essential for developing cooperative state, local, tribal, regional and international programs to prevent and control air pollution and for ensuring that national standards are met.

MEANS AND STRATEGY

EPA develops standards to protect public health and the environment that limit concentrations of the most widespread pollutants (known as criteria pollutants), which are linked to many serious health and environmental problems:

- Ground-level ozone. Exacerbates respiratory illness especially in active children, aggravates respiratory illnesses such as asthma and causes damage to vegetation and visibility problems.
- Carbon monoxide. Interferes with the delivery of oxygen to body tissues, affecting particularly people with cardiovascular diseases.
- Sulfur dioxide. Aggravates the symptoms of asthma and is a major contributor to acid rain.
- Nitrogen oxides. Irritates the lung and contributes to the formation of ground-level ozone, acidic deposition and visibility problems.
- Lead. Causes nervous system damage, especially in children, leading to reduced intelligence.
- Particulate matter (PM). Linked to premature death in the elderly and people with cardiovascular disease, respiratory illness in children; affects the environment through visibility impairment.

Hazardous air pollutants (HAPs), commonly referred to as air toxics or toxic air pollutants, are pollutants that cause, or may cause, adverse health effects or ecosystem damage. The Clean Air Act (CAA) lists 188 pollutants or chemical groups as hazardous air pollutants and targets sources emitting them for regulation.

Examples of air toxics include heavy metals like mercury and chromium, dioxins and pesticides such as chlordane and toxaphene. HAPs are emitted from literally thousands of sources including stationary as well as mobile sources.

Adverse effects to human health and the environment due to HAPs can result from exposure to air toxics from individual facilities, exposures to mixtures of pollutants found in urban settings, or exposure to pollutants emitted from distant sources that are transported through the atmosphere over regional, national or even global air sheds.

Compared to information for the criteria pollutants, the information concerning potential health effects of the HAPs (and their ambient concentrations) is relatively incomplete. Most of the information on potential health effects of these pollutants is derived from experimental animal data. Of the 188 HAPs referenced previously, almost 60 percent are classified by EPA as known, probable or possible carcinogens.

Some Maximum Achievable Control Technology (MACT) standards, particularly the coating rules, typically achieve concurrent reduction in both Volatile Organic Compounds (VOC) and HAP emissions. The standards reduce the emissions created by evaporation of solvents from the coatings and these solvents often contain both HAP and VOC. Air toxic and particulate matter pollution share common sources. In some cases particulates are also hazardous air pollutants.

One of the more documented ecological concerns associated with toxic air pollutants is the potential for some to damage aquatic ecosystems. In some cases, deposited air pollutants can be significant contributors to overall pollutant loadings entering water bodies.

The Clean Air Act Amendments of 1990 established an emissions trading program to control emissions from electric power plants that cause acid rain and other environmental and public health problems. Emissions of sulfur dioxide (SO_2) and nitrogen oxide (NO_x) react in the atmosphere and fall to earth as acid rain, causing acidification of lakes and streams and contributing to the damage of trees at high elevations.

NO_x emissions are a major precursor of ozone, which affects public health and damages crops, forests, and materials. NO_x deposition also contributes to eutrophication of coastal waters, such as the Chesapeake and Tampa Bays. Additionally, before falling to earth, SO_2 and NO_x gases form fine particles that affect public health by contributing to premature mortality, chronic bronchitis, and other respiratory problems.

The fine particles also contribute to reduced visibility in national parks and elsewhere. Acid deposition also accelerates the decay of building materials and paints and contributes to degradation of irreplaceable cultural objects such as statues and sculptures.

Percent Change in National Air Quality Concentrations and Emissions (1988-1996)

	Air Quality Concentration % Change 1987-1996	Emissions % Change 1987-1996
Carbon Monoxide (CO)	-37%	-18%
Lead	-75%	-50%
Nitrogen Oxides (NOx)	-10%	+3%
Ozone (VOC)	-15%	-18%
PM_{10}*	-25%	-12%[+]
Sulfur Dioxide SO_x	-37%	-14%

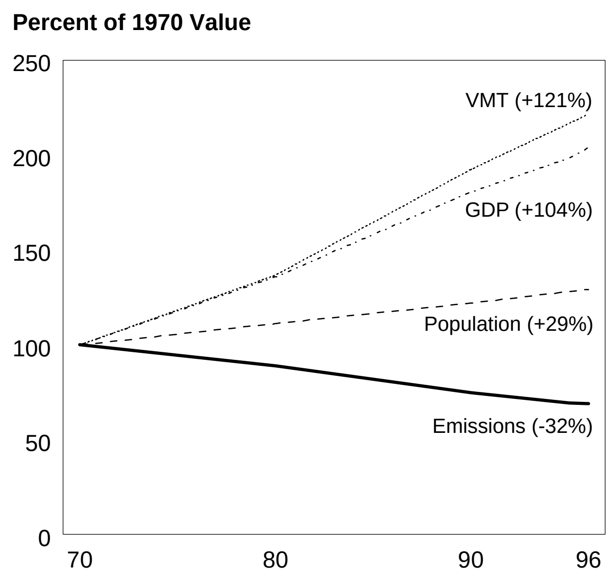
SOURCE: National Air Quality and Emissions Trend Report, 1996.
* Based on 1988 to 1996 data.
[+] Includes only directly emitted particles. Secondary PM formed from SO_x, NO_x, and other gases comprises a significant fraction of ambient PM.

The above table summarizes the 10-year percent changes in national air quality concentrations and emissions. It shows that air quality has continued to improve during the past 10 years for all six pollutants.

Nationally, the 1996 air quality levels are the best on record for all six criteria pollutants. In fact, all the years in the 1990s have had better air quality than all the years in the 1980's, showing a steady trend of improvement.

The dramatic improvements in emissions and air quality occurred simultaneously with significant increases in economic growth and population. The improvements are a result of effective implementation of clean air laws and regulations, as well as improvements in the efficiency of industrial technologies.

While progress has been made, it is important to not lose sight of the magnitude of the air pollution problem that still remains. Based upon monitoring data submitted to EPA's data base, approximately 46 million people in the United States reside in counties that did not meet the air quality standard for at least one of the National Ambient Air Quality Standards (NAAQS)



Above: Total U.S. population, vehicle miles traveled, U.S. gross domestic product, and aggregate emissions, 1970-1996.

pollutants for the single year 1996.

To continue to reduce air pollution, the Clean Air Act sets specific targets for the mitigation of each air pollution problem and identifies specific activities and a multi-year schedule for carrying them out. The Act also requires the air quality monitoring that helps us measure progress. In addition, the Act also lays out a specific roadmap for achieving those goals - what we the Agency and our partners -- states and tribes -- have to do to clean up the air. One constant across the titles in the Act is that the pollution control strategies and programs it contains are all designed to get the most cost-effective reductions early on. The early reductions program in toxics, Phase 1 of the Acid Rain program, and the MACT program were all designed to achieve early reductions, making our air cleaner and safer to breathe. The problems that remain are some of the most difficult to solve.

We have developed strategies to address this difficult increment and overcome the barriers that have hindered progress in clean air in the past. We will use the flexibility built into the Clean Air Act, which is not wedded to hard and fast formulas or specific technological requirements.

We will focus our efforts on:

- Coupling ambitious goals with steady progress - The emphasis will be on near-term actions towards meeting the standards, while giving states time to come up with more difficult measures. We recognize that it will be difficult for some areas of the country to attain the new National Ambient Air Quality Standards for ozone and fine particles, and we believe it will take more than an individual state=s efforts to achieve the needed emission reductions. We will work with states and tribes to identify ways to achieve interim reductions, principally through regional strategies, national measures and the air toxics and Acid Rain programs by building on cross-pollutant emission reductions.

  Using these strategies gets steady progress toward the goal and for many areas will achieve the goal. For those areas where additional measures are required, this work will allow steady progress toward the goal while giving states the time to identify measures that will get them that last increment to fully achieve the goal.

- Maintaining accountability with flexibility - Ensuring that there is no backsliding in the progress already made to meeting the Clean Air goal is critical. We will also use the Act=s flexibility to develop the NO_x Trading program to build on the Acid Rain program to help states and localities reduce emissions at the lowest cost.

- Fostering technical innovation where they provide clear environmental benefits - Market-based approaches provide Aniches@ for many types of technologies; no one size will fit all. Sources can improvise, innovate and otherwise be creative in reducing emissions. We will promote such technological innovation and then disseminate it to others to show how they can get needed reductions.

- Building partnerships - There are numerous forms of partnerships, all of which we have used at one point or another in the Clean Air Act: public outreach to educate people on the air problems and encourage them to work to solve them; Ozone Transport Assessment Group (OTAG)-type groups to study a problem and provide recommendations to EPA on ways to solve it; working with organizations like the National Academy of Sciences (NAS) on both short-term and long-term research priorities; and Regulatory Negotiations to bring in many interested parties to work on a problem and address a specific regulatory issue.

Research

The Agency is seeking to understand further the root causes of the air toxics environmental and human health problems in urban areas, thereby improving the ability to weigh alternative strategies for solving those problems. Research will be devoted to the development of currently unavailable health effects and exposure information to determine risk and develop alternative strategies for maximizing risk reductions. We will be able to model and characterize not only the current toxics risk and compare national program alternatives, but also to identify regional and local Ahot spots@ and model alternative strategies to assist states and localities in solving their air and water toxics problems.

Using these strategies, we will work with areas that have the worst problems to develop strategies accounting for unique local conditions that may hinder them from reaching attainment. We will also work with states/locals and tribes to ensure that work they are doing on the PM and ozone standards effectively targets both pollutants, as well as regional haze, to maximize control strategies. On the national level, we will continue to target source characterization work, especially emission factors, that is essential for the states, tribes and locals to development strategies to meet the standards.

STATUTORY AUTHORITY
Clean Air Act (CAA) and Amendments

Resource Summary

(Dollars in thousands)

	FY 1999 Pres. Budget	FY 1999 Enacted
Clean Air	**$525,639.6**	**$536,368.0**
Attain NAAQS for Ozone and PM	$361,648.7	$384,863.2
EPM	$86,102.3	$81,847.5
S&T	$128,926.6	$147,060.1
STAG	$146,619.8	$155,955.6
Reduce Emissions of Air Toxics	$97,546.9	$90,700.3
EPM	$52,651.7	$46,904.8
S&T	$22,800.7	$21,551.4
STAG	$22,094.5	$22,244.1
Attain NAAQS for CO, SO2, NO2, Lead	$44,878.2	$42,184.1
EPM	$16,750.5	$17,276.4
S&T	$113.2	$113.2
STAG	$28,014.5	$24,794.5
Acid Rain	$21,565.8	$18,620.4
EPM	$13,035.8	$11,010.7
S&T	$4,000.0	$4,002.1
STAG	$4,530.0	$3,607.6
Total Workyears:	1,777.1	1,762.3

Strategic Objective: Attain NAAQS for Ozone and PM

Key Programs

(Dollars in thousands)

	1999 Pres Bud	1999 Enacted
Particulate Matter Monitoring Network (non-grant)	$25,000	$25,000
Particulate Matter Monitoring Network Grants	$50,700	$50,735
Air, State, Local and Tribal Assistance Grants: Other Air Grants	$95,920	$155,867
Mobile Sources	$54,824	$45,975
Sustainable Development Challenge Grants *resources moved to Goal 8/Office of the Administrator in FY1999 enacted	$7,687	$0
Urban Environmental Quality and Human Health	$440	$0
EMPACT	$3,537	$2,622
Tribal Capacity	$3,813	$3,813
Research: Tropospheric Ozone Research	$19,763	$20,083
Research: Particulate Matter Research	$37,587	$55,657

Annual Performance Goals and Measures

ONE-HOUR OZONE STANDARD REVOKED

By 1999: 8 additional areas currently classified as non-attainment will have the 1-hour ozone standard revoked because they meet the old standard.

Performance Measures:	Target:
Publish Notice Revoking 1-Hour Standard	8 Areas
National Guidance on Ozone SIP	1 Issued
States submit designations of areas for attainment of the ozone standards	50 States

Baseline: As a result of the Clean Air Act Amendments of 1990, 101 areas were designated non-attainment for the 1-hour ozone standard. In 1998, as indicated in the 1997 air quality trends report, 38 areas were in non-attainment. The trends are updated each year with a one-year lag time (i.e., the 2000 information will be available in 2002).

PM-2.5 MONITORS

By 1999: Deploy PM-2.5 ambient monitors including: mass, continuous, speciation, and visibility sites resulting in a total of 1500 monitoring sites.

Performance Measures:	Target:
National Guidance on PM-2.5 SIP and Attainment Demonstration Requirements.	1 Issued
Cumulative total number of monitoring sites deployed.	1500 sites

Baseline: The Agency began working with the states to develop a PM-2.5 monitoring network in 1997 with the first monitors put in place in 1998.

RESEARCH: PM HEALTH EFFECTS

By 1999: Identify and evaluate at least two plausible biological mechanisms by which PM causes death and disease in humans.

Performance Measures:	Target:
Reports (1) describing research designed to test a hypothesis about mechanisms of PM-induced toxicity; 2) characterize factors affecting PM dosimetry in humans; 3) ID PM characteristics (coposition) .	30-SEP-99

Baseline: Development of "formal" baseline information for EPA research is currently underway.

Strategic Objective: Reduce Emissions of Air Toxics

Key Programs

(Dollars in Thousands)

	99 Pres Bud	99 Enacted
Air, State, Local and Tribal Assistance Grants: Other Air Grants	$22,095	$22,244
Federal Air Toxics Standards	$26,863	$14,092
Mobile Sources	$1,768	$1,736
EMPACT	$205	$172
Research: Air Toxics Research	$21,015	$19,682

Annual Performance Goals and Measures

AIR TOXIC EMISSIONS

By 1999: Reduce air toxic emissions by 12% in FY 1999, resulting in a cumulative reduction of 25% from 1993 levels.

Performance Measures:	Target:
Obtain data for building the 1999 National Toxics Inventory	1 Inventory
Air Toxics Emissions reduced from 1993	25 Percent

Baseline: In 1993, the last year before MACT standards and mobile source regulations developed under the Clean Air Act were implemented, stationary and mobile sources emitted 3.7 million tons of air toxics. In 1996, implementation of MACT standards decreased air toxic emissions by 0.7 million tons (20%) from 1993 emissions. Implementation of mobile source regulations (e.g., reformulated fuels) also decreased air toxics emissions. We revise air toxics emission data every three years to generate inventories for 1993, 1996, 1999, etc with a lag time of approximately two years (i.e., the 1999 inventory will be available in 2001).

RESEARCH: HEALTH ASSESSMENTS

By 1999: Complete Health Assessments for five air toxics to be indicated as high priority by the EPA and regional offices.

Performance Measures:	**Target:**
Complete four toxicological reviews and assessments (RfC, RfD, cancer unit risks) of high priority to the Air Program	5 Assessments

Baseline: Development of "formal" baseline information for EPA research is currently underway.

Strategic Objective: Attain NAAQS for CO, SO2, NO2, Lead

Key Programs

(Dollars in Thousands)

	99 Pres Bud	**99 Enacted**
Air, State, Local and Tribal Assistance Grants: Other Air Grants	$28,015	$24,795
Mobile Sources	$113	$113

Annual Performance Goals and Measures

NAAQS

By 1999: Certify that 14 of the 58 estimated remaining non-attainment areas have achieved the NAAQS for carbon monoxide, sulfur dioxide, or lead.

Performance Measures:	**Target:**
Regions take Final Action on CO Re-designation	7 Final Actions
Regions take Final Action on SO2 Re-designation	5 Final Actions
Regions take Final Action on Pb Re-designation	2 Final Actions

Baseline: As a result of the Clean Air Act Amendments of 1990, 48 areas were designated as non-attainment of the CO standard. In 1996, as indicated in the most recent air trends report, 29 areas were non-attainment. Six areas have been re-designated during 1997-1998. The air quality trends data is updated each year with a one-year lag time (i.e., the 2000 information will be available in 2002). As a result of the Clean Air Act Amendments of 1990, 54 areas were designated as non-attainment of the SO2 standard. In 1996, as indicated in the most air recent trends, 34 areas were non-attainment. The air quality trends data is updated each year with a one-year lag time (i.e., the 2000 information will be available in 2002). As a result of the Clean Air Act Amendments of 1990, 13 areas were designated as non-attainment of the lead standard. In 1996, as indicated in the most recent air trends report, 10 areas were in non-attainment. The air quality trends data is updated each year with a one-year lag time (i.e., the 2000 information will be available in 2002). There is one area in non-attainment for NOx.

Strategic Objective: Acid Rain

Key Programs

(Dollars in Thousands)

	99 Pres Bud	**99 Enacted**
Air, State, Local and Tribal Assistance Grants: Other Air Grants	$4,530	$3,608
Acid Rain -Program Implementation	$3,502	$9,951
Acid Rain –CASTNet	$4,000	$4,000

Annual Performance Goals and Measures

EMISSIONS REDUCTION

By 1999: Maintain 4 million tons of sulfur dioxide (SO2) emissions reductions from utility sources, and maintain 300,000 tons of nitrogen oxides (NOx) reductions from coal-fired utility sources.

Performance Measures:	**Target:**
SO2 Emissions	4,000,000 Tons Reduced
NOx Reductions	300,000 Tons Reduced

Baseline: The base of comparison for assessing progress on the 2000 annual performance goals is emissions levels before implementation of Title IV of the Clean Air Act Amendments in 1990. Emissions levels that would have resulted without implementation of Title IV of the CAAA were based on projection inventories of NOx emissions assuming growth without controls.

EXTERNAL FACTORS

Federal and state government agencies, industry and individuals must work together to achieve the goal of healthy, clean air. Success is far from guaranteed. Much remains to be done if the health and environmental improvement targets in the Clean Air goal are to be achieved. Meeting the goal depends on a strong partnership between the states and EPA. States will play a pivotal role by providing information and working with EPA on standard setting.

A variable that we have to consider in developing programs to achieve the Clean Air goal is the weather. In developing their clean air strategies, states and locals consider the normal meteorological patterns. However, a hot, dry summer may prevent areas from gaining the three full years of clean air data needed to gain attainment.

Additionally, clean air strategies attempt to predict changing demographics, transportation patterns, impacts of urban sprawl and industrial demands; an increase or large shift in any of these areas can significantly impact air quality.

Accomplishing the Acid Rain objective's target for a decrease in ambient concentration and deposition of nitrates assumes that other sources of nitrogen oxides (e.g. mobile sources) do not grow at a faster rate than currently projected. The Acid Rain program is also affected by demand for electric power and the fuels used by electric utilities.

Because air pollution crosses local and state lines and in some cases, crosses our borders with Canada and Mexico, the problems are both national and international in scope. Successfully achieving clean air goals will require extensive multi-state and even multi-country planning, coordination and implementation efforts.

Hazardous Air Pollutant (HAP) testing through the HAP Test Rule is also critical for development of cancer and non-cancer dose-response assessments as part of the Urban Air Toxics Strategy which seeks to reduce risk of the 30 HAPs presenting the greatest threat to public health. Without this fundamental data, toxic emission reduction and subsequent risk reduction to the American population could be significantly delayed.

VERIFICATION AND VALIDATION OF PERFORMANCE MEASURES

Attain NAAQS for Ozone and PM

Data sources:
- EPA Aerometric and Information Retrieval System (AIRS) Air Quality Subsystem;
- EPA National Emission Trends Database;
- EPA Findings and Required Elements Data System (FREDS);
- IMPROVE database.

Data from the AIRS Air Quality Subsystem are used to determine if non-attainment areas have the requisite three years of clean air data needed for re-designation. The National Emission Trends database is used to determine if the states have reduced their VOC, $PM_{2.5}$, and NO_x emissions. The FREDS system tracks the progress of states and Regions in reviewing and approving the required elements of the state implementation plans also needed for re-designation to attainment. The

IMPROVE database provides data on visibility improvement from various sites nationally.

The EPA's highway vehicle emission factor model, MOBILE, provides average in-use fleet emission factors for three criteria pollutants: Volatile Organic Compounds (VOC), CO and NO_x for each of the categories of vehicles under various conditions affecting in-use emission levels (e.g., ambient temperatures, average traffic speeds, gasoline volatility) as specified by the model user. It is used by EPA in evaluating control strategies for highway mobile sources, by states and other local and regional planning agencies in the development of emission inventories and control strategies for State Implementation Plans (SIPs) under the Clean Air Act.

The model has been periodically updated to reflect the collection and analysis of additional emission factor testing results over the years, as well as changes in vehicle, engine, and emission control system technologies, changes in applicable regulations and emission standards and test procedures, and improved understanding of in-use emission levels and the factors that influence them.

Program audits assess the effectiveness of Inspection/maintenance (I/M) programs by evaluating their operations, ability to identify pollutants, and success in ensuring the repair of vehicles. EPA also tracks the number of states implementing the programs and completion of the National Highway System Designation Act (NHSDA) program evaluations.

For the Reformulated Fuels Gasoline (RFG) program, the reporting system collects data on quality for RFG and conventional gasoline to determine fuel program benefits. The system electronically processes approximately 100,000 fuel quality reports. The electronic data interchange was recognized in the President=s report on Reinventing Government as a dramatic new industry reporting initiative.

For modeling, the verification system is the MOBILE highway vehicle emission factors model. The Agency will continue utilizing the testing results, number of labels and certificates issued for the compliance programs and testing programs.

Quality Assurance/Quality Control (QA/QC) procedures:

The QA/QC of the national air monitoring program has several major components: the Data Quality Objective (DQO) process, reference and equivalent methods program, the precision and accuracy of the collected data, EPA=s National Performance Audit Program (NPAP), systems audits, and network reviews. To ensure quality data, the State and Local Air Monitoring Sites (SLAMS) are required to meet the following: 1) each site must meet network design and siting criteria; 2) each site must provide adequate QA assessment, control and corrective action functions according to minimum program requirements; 3) all sampling methods and equipment must meet EPA reference or equivalent requirements; 4) acceptable data validation and record keeping procedures must be followed; and 5) data from the SLAMS must be summarized and reported annually to EPA.

There are additional quality assurance/quality control measures specified for the collection of particulate data, such as the Federal Reference Method Performance Evaluation Program, co-located samples, and field and laboratory blanks. Finally, there are systems audits that regularly review the overall air quality data collection activity for any needed changes or corrections.

Plans to Improve Data:

The emissions data are difficult to quality assure because of the varying methods of determining the total emissions in a given area. In the future, EPA will post all state, tribal, and local agency emissions data in a compiled data base so that all stakeholders can provide a much more intense review of the inventory. Also, the Emissions Inventory Improvement Project (EIIP) provides consistent methods of estimating emissions data and developed consistent quality assurance methods for use by the states to substantially improve state emissions data. Emissions data for the EIIP are subject to enhanced quality assurance before they are entered into an air quality model. In addition, preliminary air quality model results identify specific weaknesses in the emissions inputs.

The IMPROVE network will be enhanced by the upgrade of 30 existing IMPROVE samplers and the establishment of 78 new sites in 1998 and 1999. The new sites established in 1998 and 1999 will provide additional information on class 1 areas previously not covered in the IMPROVE monitoring network.

Research

EPA has several strategies to validate and verify performance measures in the area of environmental science and technology research. Because the major output of research is technical information, primarily in the form of reports, software, and protocols, the key to these strategies is the performance of both peer reviews and quality reviews to ensure that requirements are met.

Peer reviews provide assurance during the pre-planning, planning, and reporting of environmental science and research activities that the work meets peer expectations. Only those science activities and resulting information products that pass Agency peer review are addressed and published. This applies to program-level, project-level, and research outputs. The quality of the peer review activity is monitored by EPA to ensure that peer reviews are performed consistently, according to Agency policy, and that any identified areas of concern are resolved through discussion or the implementation of corrective action.

The Agency=s expanded focus on peer review helps ensure that the performance measures listed here are verified and validated by an external organization. This is accomplished through the use of the Science Advisory Board (SAB) and the Board of Scientific Counselors (BOSC). The BOSC, established under the Federal Advisory Committee Act, provides an added measure of assurance by examining the way the Agency uses peer review, as well as the management of its research and development laboratories.

In 1998, the Agency presented a new Agency-wide quality system in Agency Order 5360.1/chg 1. This system provided policy to ensure that all environmental programs performed by or for the Agency be supported by individual quality systems that comply fully with the American National Standard, *Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs* (ANSI/ASQC E4-1994).

The order expanded the applicability of quality assurance and quality control to the design,

construction, and operation by EPA organizations of environmental technology such as pollution control and abatement systems; treatment, storage, and disposal systems; and remediation systems. This rededication to quality provides the needed management and technical practices to assure that environmental data developed in research and used to support Agency
decisions are of adequate quality and usability for their intended purpose.

A quality assurance system is implemented at all levels in the EPA research organization. The Agency-wide quality assurance system is a management system that provides the necessary elements to plan, implement, document, and assess the effectiveness of quality assurance and quality control activities applied to environmental programs conducted by or for EPA. This quality management system provides for identification of environmental programs for which Quality Assurance/Quality Control (QA/QC) is needed, specification of the quality of the data required from environmental programs, and provision of sufficient resources to assure that an adequate level of QA/QC is performed.

Agency measurements are based on the application of standard EPA and American Society for Testing and Materials (ASTM) methodology as well as performance-based measurement systems. Non-standard methods are validated at the project level. Internal and external management system assessments report the efficacy of the management system for quality of the data and the final research results. The quality assurance annual report and work plan submitted by each organizational unit provides an accountable mechanism for quality activities. Continuous improvement in the quality system is accomplished through discussion and review of assessment results.

The Office of Research and Development Management Information System (OMIS) will be another accountability tool used to monitor and track performance measures. The GPRA structure will be incorporated into OMIS to ensure consistent maintenance and reporting, resulting in greater accuracy and consistency of information to users.

Reduce Emissions of Air Toxics

<u>Data sources</u> include:

- EPA=s Toxics Release Inventory (TRI);
- National Toxic Inventory (NTI);
- Aerometric Information Retrieval System (AIRS)
- MACTRAX
- EVENTS

The NTI houses emissions estimates for hazardous air pollutants (HAPs). Currently, we have completed a 1993 base-year NTI and are developing estimates for the 1996 NTI. Both contain emissions estimates for major area and mobile source categories, but at different levels of detail.

The main improvement in the 1996 version will be the addition of facility-specific parameters that will make the inventory useful for dispersion modeling. To date, we have collected emission inventory data to update the NTI from:

(1) emissions data gathered to support development of MACT standards for source categories, which are required to be promulgated within two, four, seven, and ten years of enactment of the 1990 Clean Air Act amendments;

(2) The externally and internally peer-reviewed national inventories undertaken to support regulation of seven specific HAPs requiring standards under section 112(c)(6) and 40 HAPs pursuant to section 112(k);

(3) State and local inventories (34 states);

(4) TRI, which consists of data submitted by facilities and required under Right-To-Know legislation.

All of the above data sources rely on estimation techniques since emission testing at every facility would be resource intensive. Often data from source tests are extrapolated to other similar sources. In addition to source testing, other estimation techniques include material balances, and emission factors (e.g., pounds throughput per year). For source categories for which we have no data, we generally develop emissions data using emission factors and activity level.

An update of the 1993 NTI was completed in October 1998, including a complete compilation of MACT baseline emissions data for two-year, four-year, seven-year, and the majority of ten-year source categories. We also plan to complete the compilation of 1996 NTI draft major and mobile source data. The 1996 NTI, including internal and external review, will be completed by September 30, 1999.

MACTRAX provides a mechanism to track the air implementation activities by each state to insure that the emission reductions expected from the development of MACT standards can be realized through full implementation of the standards. The EVENTS tracking system provides a means to track the proposal and promulgation of air toxics MACT and other regulations.

We plan to deploy Phase 1 of the national air toxics network by March 1999. At a minimum there will be 17 monitors in 1999, increasing to 40 monitors in 2000. Depending on how the resources are distributed (sites chosen, pollutants monitored, etc.), the number of monitors reporting as part of the national air toxics network could be substantially more than the numbers above.

QA/QC Procedures

Procedures for QA/QC of emission and ambient air toxics data are not as institutionalized as those used for the criteria pollutant program. Air toxics data are not currently required of states, but are submitted voluntarily. EPA does review the data to assure data quality and consistency, but no formal procedures are in place for quality assurance. Regional offices review all MACTRAX data before it is placed in the system. EPA sends the NTI data to states for their review and incorporates state comments and data into the system. Procedures are now being finalized to assure the quality of emissions inventory data collected from industry, which is used for the development of technology-based emission standards.

At present, we are developing Data Quality Objectives (DQOs), Quality Assurance Plans (QAPs), and a network design document for the national ambient air toxics network, which will be transmitted to the states and Regions to help design and deploy the network. When completed, these documents will help answer questions on the interpretations and limitations of the data collected from this network.

Mobile source data are validated by using speciated test data from the mobile source emission factor program, along with peer reviewed models which estimate national tons for the relevant year of interest.

Data Limitations:

The 1996 NTI will be the first EPA effort to estimate not only HAP emissions on a national scale, but also to associate source-specific parameters necessary for modeling such as location and facility characteristics (stack height, exit velocity, temperature, etc.) to emissions. The compilation of this huge amount of data presents a significant challenge to EPA. Since HAP estimates have not previously been required, current data are limited and new methodologies for estimating emissions are necessary.

A total of 34 states voluntarily compiled and delivered HAP 1996 emissions inventories to EPA. Because states are not subject to reporting requirements, these state data vary in completeness, format, and quality. The majority of state data is likely to be based on emissions estimation as opposed to direct measurement.

The EPA is evaluating and supplementing the state data with emissions data gathered during the development of MACT standards and with TRI data. Estimates obtained from regulatory development programs such as MACT are accepted as the best available data for the inventory because they are based on recent test data, control information, representative modeling scenarios, and input from industry and EPA experts. The TRI data used to supplement the NTI is likely also to be based on estimations and is limited in that data is submitted by thousands of individual facilities whose submissions are not quality assured and who may have differing estimation methods and interpretations of TRI reporting requirements. For sources not included in the state inventories, MACT data, or TRI, and for states with no data submittals, EPA estimates air toxic emissions by using emission factors and corresponding activity data.

Although emission factors are not intended for estimations of emissions on a source-specific basis, EPA believes it is appropriate to use such factors in a national inventory covering a large number of sources. However, this does not provide a complete solution because there are not emissions factors developed for all source categories that emit HAPs.

Plans to Improve Data:

The emissions data are hard to quality assure because of the varying methods of determining the total emissions in a given area. In the future, we will post all state emissions data in a compiled data base so that states and other interested parties can provide a much more intense review of the inventory. The Emissions Inventory Improvement Program (EIIP) provides consistent methods of estimating emissions and is another method for developing better state emissions data. We prepared air toxics emissions inventory guidance for state and local agencies in 1998.

We document all emission estimates in the 1996 NTI so users of the data can determine how each estimate was developed. In order to improve the 1996 NTI data, we plan to provide the data to states and other interested parties for external review, incorporate additional state and MACT data, and continue gap-filling. In 1999, we will conduct internal QA/QC to improve the data. Specific internal activities will include evaluation of state data, MACT data and TRI data for individual facilities and a comparison of air toxics data to VOC/PM data.

Research

(See above Research section under Attain NAAQS for Ozone and PM.)

Attain NAAQS for CO, SO2, NO2, Lead

Data sources:

- EPA AIRS Air Quality Subsystem;
- EPA National Emission Trends Database;
- EPA Flexible Regional Emissions Data System.

Data from the National Emission Trends Database and the AIRS Air Quality Subsystem are used to determine if non-attainment areas have the requisite three years of clean air data needed for re-designation. The National Emission Trends database will be used to determine if the states have reduced their CO, SO_2, and lead emissions. The Findings and Required Elements Data System (FREDS) system tracks the progress of states and

Regions in reviewing and approving the required elements of the state implementation plans also needed for re-designation to attainment.

<u>QA/QC procedures</u>:

The QA/QC of the national air monitoring program has several major components: the Data Quality Objective process, reference and equivalent methods program, the precision and accuracy of the collected data, EPA=s National Performance Audit Program (NPAP), systems audits, and network reviews.

To ensure quality data, the State/Local Air Monitoring System (SLAMS) is required to meet the following: 1) each site must meet network design and siting criteria; 2) each site must provide adequate QA assessment, control, and corrective action functions according to minimum program requirements; 3) all sampling methods and equipment must meet EPA reference or equivalent requirements; 4) acceptable data validation and record keeping procedures must be followed; and 5) data from the SLAMS must be summarized and reported annually to EPA.

<u>Plans to Improve Data</u>:

The emissions data are hard to quality assure because of the varying methods of determining the total emissions in a given area. In the future, EPA will post all state, tribal, and local emissions data in a compiled data base so that all interested parties can provide a much more intense review of the inventory. The Emission Inventory Improvement Program (EIIP), which provides consistent methods of estimating emissions data and developed consistent quality assurance methods for use by the states, will improve the quality of state emissions data.

Since the dominant source of CO emissions is on-road mobile sources, the best means of improving the quality of the emission estimates is to provide precise inputs to the MOBILE model (used to calculate mobile source emission factors) and develop more precise estimates of Vehicle Miles Traveled (VMT). These two inputs (emission factors and VMT) determine the emissions from on-road mobile sources.

Acid Rain

The Acid Rain program performance data are some of the most accurate data collected by the EPA because the data for most sources (all coal-fired sources) consists of *actual* monitored, instead of estimated, emissions. The emissions data is collected through continuous emissions monitors (CEMS) and electronically transferred directly into EPA=s Emissions Tracking System (ETS). Actual emissions of SO_2, NO_x and CO_2 are measured for each unit/boiler within a plant. The ETS allows EPA to track actual reductions for each unit, as well as aggregate emissions by all power plants and affected industrial facilities. A principal output of the ETS is the publication of quarterly and annual emission reports based on emissions monitoring data. The ETS quarterly and annual reports include summary statistics for SO_2, $NO_{x,}$ CO_2 and emissions.

<u>QA/QC procedures</u>:

The Acid Rain program also tracks indicators which validate the quality of the emissions data, such as the accuracy of the monitors achieved during certification testing. There are four validation measures that help to demonstrate the high quality of the data collected: the number of CEMS certified; the percentage of CEMS that meet the 10% relative accuracy standard; the percentage of CEMS that exceed the 7.5% relative accuracy target; and, the number of quarterly reports processed.